REMARKS

This Response is in reply to the Examiner Interview conducted September 20, 2006, the Notice of Appeal filed June 26, 2006, and the Final Office Action dated January 26, 2006.

Extension of Time

Applicant respectfully requests that a 4-month extension of time be granted in which to respond to the Notice of Appeal filed June 26, 2006, which was filed in response to the Office Action mailed January 26, 2006, said period of response being extended from September 26, 2006 to December 26, 2006.

Request for Continued Examination (RCE)

Under 37 C.F.R. §1.114, Applicant respectfully requests that this application be accorded the benefits of Continued Examination.

Examiner Interview

Applicant would like to thank Examiner Dixon for the courtesy extended during the Examiner interview held September 20, 2006. During the Interview Applicant showed Examiner Dixon one exemplary product and discussed independent claims 1, 21, and 54 and the pending rejection of *Evans* (U.S. Patent No. 6,616,971) in view of *Shaw et al.* (U.S. Patent No. 4,643,940). Applicant proposed amending nylon to recite "non-aromatic" nylon, to more clearly identify the nylon fiber and thermoplastic fused matrix comprising nylon recited in independent claims 1, 21, and 54. Examiner Dixon indicated he would consider Applicant's proposed amendment and would conduct a new search based on Applicant's proposed Amendment.

Claim Amendments

Claims 1-11, 21-33, 43-45, and 54-58 are amended. Claims 12, 34 and 47 are canceled without prejudice. Claims 59-62 are new. Applicant respectfully submits that no new matter has been added by this amendment.

Claims 1-2, 5, 7, 21, 22, 28, 45, and 54-56 have been amended to recite "non-aromatic nylon." This amendment is supported at least by the original disclosure of nylon 6 and nylon 6,6 throughout the specification as filed.

Claims 1, 21, 45, and 54 have also been amended to recite "wherein the composite comprises non-aromatic nylon fibers that are partially melted and others that remain unmelted." This amendment is supported at least at page 11, lines 23-26 of the specification as originally filed.

In addition, claims 1-11, 21-33, 43-45, and 54-58 have been amended editorially.

New claim 59 is supported at least by Example 1 at page 13 of the specification as originally filed.

New claims 60 and 61 incorporate features of claim 45 and depend from claims 21 and 45 respectively and are supported by the specification as originally filed.

New claim 62 incorporates features of claim 45. New claim 62 also recites "introducing the balanced carpet feed stock into an extruder having at least one barrel zone, wherein said introducing is at a temperature, pressure, and rate sufficient to form a matrix surrounding partially melted non-aromatic nylon fiber and unmelted non-aromatic nylon fiber, and wherein the temperature of said at least one barrel zone is greater than about 250°C to form a matrix-fiber material." This amendment is supported at page 8, lines 17-25 and page 9, line 26 through page 10, line 9 of the specification as originally filed.

Rejoinder

Applicant respectfully requests the Examiner rejoin method claims 45, 48-53, and 60-62 upon allowance of product claims 1-11, 13-33, 35-44, and 54-59. Claims 1-11, 13-33, 35-46, and 48-62 are pending.

Claim rejections - 35 U.S.C. § 103

Claims 1-44 and 54-58 are rejected under 35 U.S.C. §103(a) as being obvious over *Evans* (U.S. Patent No. 6,616,971) in view of *Shaw et al.* (U.S. Patent No. 4,643,940). Applicant respectfully traverses this rejection.

Independent claims 1, 21, and 54 are directed to a structural composite material and recite a composite material including non-aromatic nylon fiber dispersed in a fused matrix containing polyolefin and non-aromatic nylon, in which the composite comprises non-aromatic nylon fibers that are partially melted and others that remain unmelted. Independent claims 1, 21, and 54 further recite the unmelted non-aromatic nylon fibers are dispersed in the fused matrix and the composite structural material has a flexural elastic modulus (ASTM D790) of at least about $2 \cdot 10^5$ psi. Independent claim 1 further recites the non-aromatic nylon fiber has a length of about 0.9 cm to 8 cm and a diameter of about 0.2 mm to 7 cm. Independent claim 21 further recites the non-aromatic nylon fiber has a diameter of about 0.2 mm to 7 cm. Independent claims 21 and 54 further recite that the non-aromatic nylon fiber is derived from carpet, carpet recycle, carpet scrap, or mixtures thereof.

Evans and *Shaw et al.* do not teach all claim limitations:

It is respectfully pointed out that neither *Evans* nor *Shaw et al.* teach or suggest all the limitations of the instant claims. In particular, neither *Evans* nor *Shaw et al.* teach or suggest a structural composite material including a non-aromatic nylon fiber dispersed in a fused matrix containing polyolefin and non-aromatic nylon, in which the composite comprises non-aromatic nylon fibers that are partially melted and others that remain unmelted as recited by independent claims 1, 21, and 54. Neither *Evans* nor *Shaw et al.* teach or suggest a composite material comprising a non-aromatic nylon fiber having a length of about 0.9 cm to 8 cm and a diameter of about 0.2 mm to 7 cm, as recited by independent claim 1. Neither *Evans* nor *Shaw et al.* teach or suggest a composite material comprising a non-aromatic nylon fiber derived from carpet, carpet recycle, or carpet scrap, and that the non-aromatic nylon fiber has a diameter of about 0.2 mm to 7 cm, as recited by independent claim 21. Furthermore, neither *Evans* nor *Shaw et al.* teach or suggest a composite structural material comprising unmelted non-aromatic nylon fibers and

having a flexural elastic modulus (ASTM D790) of at least about $2 \cdot 10^5$ psi as recited by independent claims 1, 21, and 54.

The Examiner alleges that *Evans* teaches a composite structural material comprising non-aromatic nylon fibers of a specific diameter dispersed in a diffused matrix, but acknowledges that *Evans* fails to disclose fibers of the claimed lengths. Shaw is cited as a secondary reference, allegedly disclosing similar composite materials with similar fiber lengths. Applicants respectfully submit neither references, alone or in combination, disclosed the elements of the instant claims.

Evans is directed to a composite material for military airplanes. See col. 1, ll. 33-35. In particular, *Evans* teaches a polymer matrix embedded with high strength fibers, i.e. glass, polyaramide, or graphite. The Examiner asserts the polyaramide fibers taught by *Evans* could include non-aromatic nylon fibers. Applicant respectfully disagrees with this assertion for at least the following reasons. *Evans* teaches a material formed of ordered polymer fibers including Kevlar® and Twaron® polyaramides. See col. 5, ll. 45-46. It is respectfully pointed out that aramide is a shortened term for "*aromatic polyamide*". *Evans* also teaches a material comprising other ordered aromatic polymer fibers, i.e., polybenzimidazole, polybenzoxazole, and polybenzbisthiazole. See col. 5, ll. 46-48. *Evans* fails to teach or suggest a composite material comprising non-aromatic nylon fibers, as this term is used in the industry.

In contrast to the claimed invention, *Evans* discloses composite materials formed of "*aromatic polyamide*" fibers and specifically lists Kevlar® and Twaron® as exemplary polyaramides. The Evans reference does not disclose or suggest composites comprising non-aromatic nylon fibers. This distinction is important because non-linear aromatic fibers such as Kevlar® and Twaron® have very different properties than non-aromatic linear fibers such as non-aromatic nylon, including Nylon 6 and Nylon 6,6. Polyaramide fibers are stiff and brittle, for example, while non-aromatic nylon fibers are more flexible. For at least these reasons, *Evans* fails to teach or suggest a composite material including non-aromatic nylon fiber dispersed in a fused matrix containing polyolefin and non-aromatic nylon, in which the non-aromatic nylon includes partially melted non-aromatic nylon fiber of the present invention.

Evans also fails to teach or suggest a composite material comprising fiber derived from carpet, carpet recycle, or carpet scrap, as recited by independent claim 21. As discussed above, *Evans* teaches composites formed of aromatic polymer fibers, and does not disclose

partially melted or unmelted non-aromatic nylon fiber.

Evans specifically teaches fibers such as graphite, glass, and ordered polymer fibers having an average fiber diameter ranging from 7 micron to 20 micron in diameter (Col. 5, ll. 36-37). *Evans* fails to teach or suggest a composite comprising non-aromatic nylon fiber, and does not teach or suggest a fiber diameter of 0.2 millimeter to 7 centimeter as recited by independent claims 1 and 21. *Evans* discloses "polyamides (e.g., nylons)" at Col. 6, lines 4-6, when describing particles of polymers useful as thermoplastic particles for coating the fibers. Fiber diameters recited in *Evans* are on the scale of microns (*See,* for example, Figure 5).

The secondary reference, *Shaw et al.,* fails to remedy the deficiencies of *Evans* and also fails to disclose or suggest a composite structural material comprising non-aromatic nylon fibers as claimed. *Shaw* is directed to a high void volume (lofted) fiber-reinforced resin-composite. The composite of *Shaw et al.* is formed of a heat fusible resin and short (3-25mm), "relatively stiff" fibers (column 3, lines 18-19) with a "very high flexural stiffness" (column 1, lines 66-68).

The examples of composite materials provided in *Shaw* each incorporate glass fibers. These materials have a flexural elastic strength (ASTM D-790), for example, shown in Table II for Samples V-B and V-C made according to the *Shaw et al.* invention, of 9,711 psi and 4,176 psi, respectively.

Shaw fails to teach or suggest a structural composite material comprising a non-aromatic nylon fiber dispersed in a fused matrix containing polyolefin and non-aromatic nylon, in which the composite comprises non-aromatic nylon fibers that are partially melted and others that remain unmelted, as recited by the present invention. *Shaw* fails to teach or suggest a composite comprising partially melted and unmelted non-aromatic nylon fiber, as recited by independent claims 1, 21, and 54. *Shaw* fails to teach or suggest a fiber derived from carpet, carpet recycle, or carpet scrap, as recited by independent claim 21. *Shaw* further fails to teach or suggest a composite structural material having a flexural elastic modulus (ASTM D790) of at least about $2 \cdot 10^5$ psi as recited by independent claims 1, 21, and 54. For at least these reasons, the rejection should be removed.

No motivation to combine *Evans* and *Shaw et al.* & No reasonable expectation of success:

No motivation is provided in either reference for the cited combination of *Shaw et al.* with *Evans*. *Evans* is directed to a high strength, dense composite material for military

airplanes. See col. 1, ll 33-35. In particular, *Evans* teaches a polymer matrix embedded with high strength fibers, i.e. glass, polyaramide, or graphite. *Evans* specifically teaches that, should the matrix include voids or other defects, such defects can lead to degradation of the structural integrity of the matrix and ultimately loss of strength of the composite. See col. 4, ll. 52-56. Therefore, the object of *Evans* is to create a high density, defect-free, composite matrix.

In contrast, *Shaw et al.* is directed to a high void volume fiber-reinforced resin-composite. In particular, *Shaw et al.* teaches a low density (lofted), short fiber-reinforced resin composite, in which the composite has a high void volume. See Abstract and col. 1, ll. 40-43.

The Office Action states *Evans* teaches a specific diameter of fiber but fails to teach the claimed fiber length, and that it would have been obvious to incorporate the fiber lengths taught by *Shaw et al.* in the absence of unexpected results, motivated by the desire to produce articles of desired characteristics/properties. Applicants respectfully disagree with this assertion for at least the following reasons.

Evans teaches that there are two major types of fibers: (1) chopped glass fibers useful to make composites of relatively lower strength and contain 20%-40% of fiber by volume; and (2) continuous fibers in yarn form useful for stiffer and/or stronger composites and containing more than 50% fiber by volume. See col. 1, ll. 36-43. *Evans* also specifically teaches stiffer fibers include graphite, polyaramid, or special glass fibers. See col. 1, ll. 43-45.

Evans uses continuous fibers (yarns) to produce stiff/strong composite having a high density. In contrast, *Shaw et al.* teaches short reinforcing fibers (Abstract), for a flexible, porous, low density carpet backing. No motivation is found in either reference to combine the short fiber dimensions of *Shaw et al.* with the long fiber dimensions of *Evans* since *Shaw et al.* requires a low density/high void composite and *Evans* requires a high density/low void volume composite.

Furthermore, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified then the teachings of the references are not sufficient to render the claims *prima facie* obvious. MPEP 2141.01

As presented above, *Evans* requires a composite with continuous fibers (yarn) and having a high density and low void volume composite, whereas *Shaw et al.* requires a composite with short fibers and having a low density, i.e. less than 0.36 gm/cc. Moreover, use of short fibers

within the *Evans* invention would render the *Evans* invention inoperable, since *Evans* requires high density and low void volume to produce a material that can withstand military aircraft use.

In summary, neither reference, alone or in combination, teaches or suggests a composite structural material comprising partially melted and unmelted non-aromatic nylon fibers as claimed. For at least the reasons discussed above, neither *Evans* nor *Shaw et al.*, alone or in combination, render the limitations of independent claims 1, 21, and 54 obvious. Applicants assert that independent claims 1, 21, and 54 are patentably distinguishable over *Evans*, *Shaw et al.*, or any combination thereof. Withdrawal of this rejection with regard to independent claims 1, 21, and 54, and their dependents, is respectfully requested.

Conclusion

In summary, Applicant submits that each of claims 1-11, 13-33, 35-46, 48-62 is in condition for allowance, and notification to that effect is earnestly solicited. The Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below, if the Examiner believes that doing so will expedite prosecution of this patent.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
(612) 332-5300

23552
PATENT TRADEMARK OFFICE

Dated: January 26, 2006

By Denise M Kettelberger
Denise M. Kettelberger
Reg. No. 33,924

DMK:SMM